Biological Nitrogen Removal through Nitritation Coupled with Thiosulfate-Driven Denitritation

(Supplementary Information)

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Table S1. Composition of stock nutrient solution for both nitrifying sludge[a] and AnUSB reactor.

Component	Concentration (g/L)	Component	Concentration (g/L)
NH_4Cl	18.45	$FeCl_3 \cdot 6H_2O$	2
K_2HPO_4	1.92	H_3BO_3	0.2
KH_2PO_4	0.72	$CuSO_4$	0.05
$MgCl_2 \cdot 6H_2O$	8.32	KI	0.08
$CaCl_2$	5.2	$MnSO_4 \cdot 4H_2O$	0.25
$NaHCO_3$	62.4	$ZnSO_4 \cdot 7H_2O$	0.15
		$CoCl_2 \cdot 6H_2O$	0.2

[a]Organic carbon (as glucose) was additionally dosed to the nitrifying sludge, resulting in an influent COD concentration of 480 mg COD/L.

Table S2. Conditions for the nitrifying sludge cultivation.

Effective reactor volume (L)	2.4
Exchange ratio	0.5
Temperature (^oC)	23 ± 1
pH	7.5~8.0
HRT (hrs)	8
DO concentration (mg/L)	2~3
Influent NH_4^+ concentration (mg N/L)	240
Influent COD concentration (mg COD/L)	480
MLVSS concentration (mg/L)	3200

Table S3. Conditions (i.e. pH, initial NO_2^- and $S_2O_3^{2-}$ concentrations) for the 8 batch reactors and 8 control reactors (without $S_2O_3^{2-}$ as the electron donor) in Batch Test II – biomass-specific denitritation activities under different initial NO_2^- concentrations, pH and FNA concentrations.

		pH	NO_2^- conc. (mg N/L)	$S_2O_3^{2-}$ conc. (mg S/L)
Batch Reactors	1	7.5	30	360
	2	7.5	60	
	3	7.5	90	
	4	7.5	120	
	5	6.0	60	
	6	7.0	60	
	7	8.0	60	
	8	9.0	60	
Control Reactors	1	7.5	30	0
	2	7.5	60	
	3	7.5	90	
	4	7.5	120	
	5	6.0	60	
	6	7.0	60	
	7	8.0	60	
	8	9.0	60	

Table S4. Primer of the DNA amplification for NSBR and AnUSB reactor at the beginning and end of operation.

Barcode Sequence	Primer
ATGCTACGTC	(V1-V3) 8F: 5’-AGAGTTTGATCCTGGCTCAG-3’ 533R: 5’-TTACCGCGGCTGCTGGCAC-3’

30

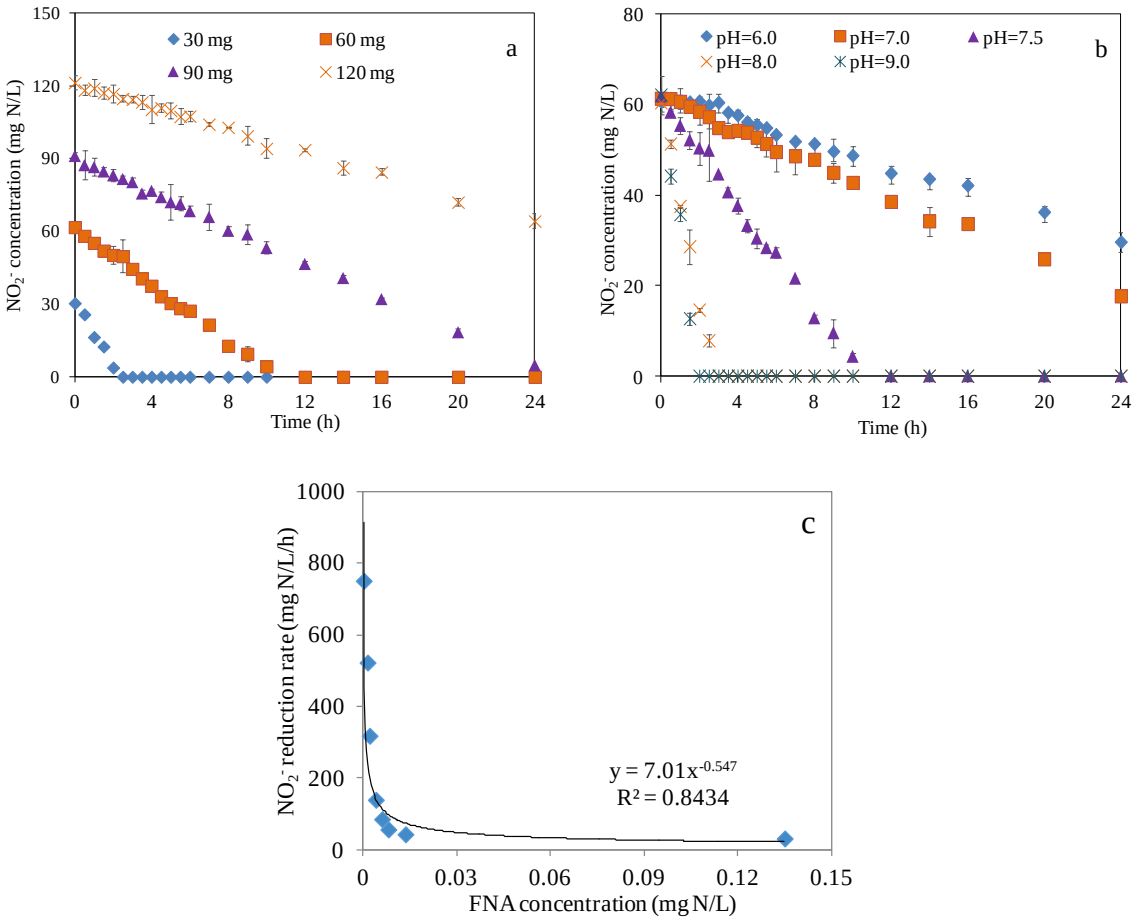

Figure S1. Batch Test II results - biomass-specific denitritation activities under different initial NO_2^- concentrations, pH and FNA concentrations: (a) Profile of nitrite for Batch Reactors 1 to 4 (under different initial NO_2^- concentrations) in Batch Test II; (b) Profile of nitrite for Batch Reactors 5 to 8 (under different pH) in Batch Test II; (c) relationship between NO_2^- reduction rates and initial FNA concentrations in each reactor of Batch Test II.